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1988 Pittsburgh Conference Program
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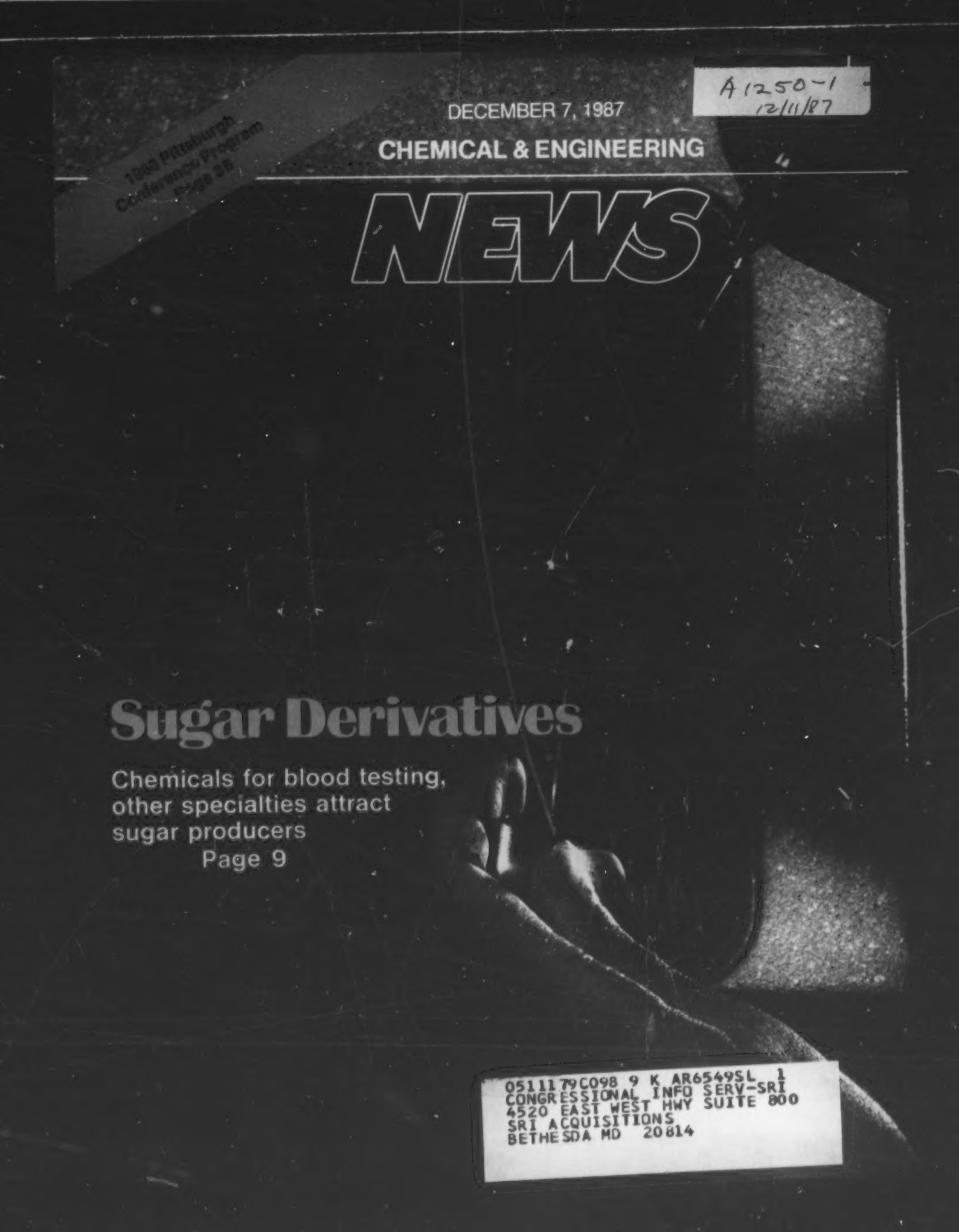
CHEMICAL & ENGINEERING

NEWS



Sugar Derivatives

Chemicals for blood testing, other specialties attract sugar producers

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CHEMICAL & ENGINEERING NEWS

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DECEMBER 7, 1987

News of the Week

■ **Improved relationships with U.S. scientific, technological, and industrial communities will be sought during U.S.-Soviet summit this week in Washington.** **Page 4**

■ **Top Montedison executives' battle over chairmanship may entail major changes in the Milan-based chemical company.** **Page 5**

■ **Proposed EPA regulations would cut production of chlorofluorocarbons in U.S. 50% by 1998 and restrict use.** **Page 5**

■ **EPA program that monitors toxic chemicals in human tissues may end this year because of budget constraints.** **Page 6**

Government

New nuclear waste bill calls for selection of permanent repository site by 1989, construction of monitored retrievable storage facility. **Page 15**

EPA opposes indoor air quality bill supported by environmentalists, says it's too expensive and provides no new regulatory authority. **Page 16**

Science

Coulomb explosion technique is valuable direct method for determining structure of molecular ions. **Page 25**

Methyl group in tricyclic orthoamide has carbon-hydrogen bonds virtually eclipsed with three adjacent single bonds. **Page 28**

Evidence accumulates on three-electron covalent bond that may have wide implications in organic chemical reactivity. **Page 32**

Meetings

1988 Pittsburgh Conference miniprogram includes symposium sessions, registration and other information. **Page 35**

Cover: Performance of blood analysis. Photo by Jim Olive/Uniphoto Picture Agency

Business

Worldwide surplus of sugar is leading many sugar producers to look into commercialization of third- and fourth-generation derivatives, search for new uses in specialty chemical markets. **Page 9**

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LETTERS

Fragmentation fluorescence spectrometry techniques

SIR: Certainly there is nothing new under the sun, but to be honest, it almost seems that there is nothing new in the chemical literature either. An article on new strategies in spectroscopy (C&EN, Sept. 21, page 45) featured Earl Wehry's presentation at the ACS New Orleans meeting. Briefly put, Wehry's group uses an intense ultraviolet laser to dissociate molecules yielding small electronically excited fragments. The fragment fluorescence pattern is shown to characterize the parent. The method is powerful, but it is neither new nor unpublished.

Our group at Howard explicitly demonstrated this and related methods [Halpern, J. B., Jackson, W. M., McCrary, V. R., "Multiphoton sequential photodissociative excitation: a new method of remote atmospheric sensing," *Appl. Opt.*, **18**, 590 (1979); and Halpern, J. B., Koker, E. B., Jackson, W. M., "Fluorescence spectrometry with photodissociative excitation of ammonia and hydrazine," *Anal. Chem.*, **55**, 2000 (1983)]. We were the first to show how efficient excimer lasers were for the photodissociative excitation of fragment emission from a variety of species in 1978 [Jackson, W. M., Halpern, J. B., Lin, C. S., "Multiphoton photodissociative excitation," *Chem. Phys. Letts.*, **55**, 254 (1978)]. Unique signature curves were shown for several polyatomic molecules.

The article in *Analytical Chemistry* showed how the NH emission from excimer laser photodissociation of ammonia could be used for quantitative remote sensing. Although a fixed frequency source was used, we pointed out the advantages of tunability.

The UV laser method depends on multiphoton processes. Therefore, the signature and sensitivity are intensity dependent. Flux-dependent photodissociative excitation is a better analytical tool. In the work described in *Analytical Chemistry*, a Kr resonance lamp was used to detect, quantitate, and distinguish between ammonia and hydrazine.

The correspondence between our statements and the report of Ward Worthy about Wehry's work is eerie. Worthy writes: "Wehry noted that luminescence methods, despite their advantages, have one major shortcoming: Most compounds simply don't fluoresce ... at levels high enough to be analytically useful. ... Wehry and his coworkers have been using a different approach, fragmentation fluorescence spectrometry [FFS], based on the fact that many large, nonluminescent molecules can be broken up into smaller, intensely luminescent fragments. Common luminescence fragments include OH, NH, CH, CN," and so on.

In our paper, one reads: "Standard fluorescence techniques are limited for analytical purposes by the relatively small number of substances which emit light. ... In general, only fluorescence from diatomic and triatomic molecules ... may be dispersed sufficiently to be rotationally and vibrationally analyzed. ... In the last 15 years a large body of work has shown that small excited fragments are produced when polyatomic molecules are dissociated by vacuum ultraviolet. ... The pattern of the fluorescence from the photodissociately excited molecule is idiosyncratic, depending on both the identity of the parent and the energy of the light."

By the way, we referred to the method as photodissociative fluorescence signature analysis (PFSA) eight years ago. I am glad that the idea has found recognition, and I do believe that it is a powerful addition to the analytical toolchest, but we would appreciate a share of the credit for our published work.

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Howard University, Washington, D.C.

Wehry's response: We certainly have no objection whatsoever to Professor Halpern and his coworkers seeking and receiving appropriate credit for their work in detection of nonfluorescent molecules via fragment fluorescence. However, his inference that our published work contains "nothing new," being merely duplicative of his, is not correct.

For example, the published work of

Corrections

- Nov. 16, page 12: In the table, Air Products & Chemicals sales for the first nine months of 1987 were $1598.4 million, not $2132.2 million; earnings were $121.2 million, not $159.7 million.
- Nov. 23, page 22: The legend on the map is incorrect. It should have indicated that the AIDS virus HIV-1 is predominant in the large area of central Africa, whereas HIV-2 appears more frequently in the West African countries of Senegal, Gambia, and Guinea; both HIV-1 and HIV-2 appear in the West African countries of Ivory Coast and Burkina Faso.